

What is claimed is :

1. A cellular system including :
  - at least one mobile station being concurrently linked through
  - 5 dedicated physical channels to plural link base stations in a soft handover state, and
  - wherein at least one packet-transmitting base station of said plural base stations transmits at least one packet through a common channel to said at least one mobile station, and
  - 10 wherein said at least one mobile station includes :
    - a first transmission power control function of controlling a current transmission power of an up-link of said dedicated physical channel based on a first transmission power control information included in down-links of said dedicated physical channels of said plural link base
    - 15 stations ; and
    - a second transmission power control function of controlling said current transmission power of said up-link of said dedicated physical channel based on a second transmission power control information included in a down-link of said dedicated physical channel of said at least
    - 20 one packet-transmitting base station, and
    - wherein if said at least one mobile station is placed in a first state to receive a packet from said at least one packet-transmitting base station, then said at least one mobile station activates said second transmission

power control function, and

wherein if said at least one mobile station is placed in a second state other than said first state, then said at least one mobile station activates said first transmission power control function.

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2. The system as claimed in claim 1, wherein after said at least one mobile station has been placed in said first state, then said second transmission power control function decides an off-set power based on said second transmission power control information and increases said current  
10 transmission power by said off-set power, before said at least one mobile station will make a first transmission of an acknowledge/non-acknowledge signal to said at least one packet-transmitting base station.

3. The system as claimed in claim 2, wherein said second  
15 transmission power control function adjusts said off-set power based on said second transmission power control information which includes a difference in propagation loss between said at least one packet-transmitting base station and other of said plural link base stations in said soft handover state than said at least one packet-transmitting base station.

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4. The system as claimed in claim 2, wherein said second transmission power control function adjusts said off-set power based on said second transmission power control information which includes the

number of times of receipt of a first transmission power control signal indicating a request for power-increase from said at least one packet-transmitting base station for a predetermined period of time.

5     5.         The system as claimed in claim 2, wherein said second transmission power control function adjusts said off-set power based on said second transmission power control information which includes a receiving quality of a common pilot signal transmitted from each of said plural link base stations in said soft handover state.

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6.         The system as claimed in claim 2, wherein said second transmission power control function adjusts said off-set power based on said second transmission power control information which includes the number of times of receipt of a null transmit power control signal having a  
15 receiving quality lower than a predetermined threshold receiving quality level transmitted from said at least one packet-transmitting base station.

7.         The system as claimed in claim 2, wherein after said at least one mobile station has activated said second transmission power control  
20 function, then said second transmission power control function decides said off-set power.

8.         The system as claimed in claim 2, wherein after said at least one

mobile station has activated said second transmission power control function, then said second transmission power control function decides said off-set power based on a difference between said second transmission power control information received from said at least one  
5 packet-transmitting base station and other transmission power control information received from other of said plural link base stations in said soft handover state than said at least one packet-transmitting base station.

9. The system as claimed in claim 2, wherein said at least one  
10 packet-transmitting base station includes an additional function of increasing, by a predetermined secondary off-set power, a secondary transmission power for transmitting said second transmit power control information to said at least one mobile station, after said at least one packet-transmitting base station has transmitted an advance notice of  
15 packet transmission to said at least one mobile station.

10. The system as claimed in claim 9, wherein said additional function further decreases said increased secondary transmission power by said predetermined secondary off-set power, after said at least one  
20 packet-transmitting base station has received a notice of completion of packet transmission from said at least one mobile station.

11. The system as claimed in claim 2, wherein said second

transmission power control information includes a first number of times of receipt of a first transmission power control signal which indicates a first request for power-increase, and a second number of times of receipt of a second transmission power control signal which indicates a second request  
5 for power-decrease,

wherein said second transmission power control function counts said first and second transmission power control signals separately, and said second transmission power control function compares said first number counted to a predetermined first threshold value and also compares  
10 said second number counted to a predetermined second threshold value, and

wherein if said first number counted exceeds said predetermined first threshold value, then said second transmission power control function increases said current transmission power, and if said number counted  
15 exceeds said predetermined second threshold value, then said second transmission power control function decreases said current transmission power.

12. The system as claimed in claim 11, wherein said predetermined  
20 first threshold value is smaller than said predetermined second threshold value.

13. The system as claimed in claim 2, wherein said second

transmission power control information includes a transmission power control signal transmitted from said at least one packet-transmitting base station, and said second transmission power control function measures a receiving quality of said transmission power control signal and compares  
5 said receiving quality measured to a predetermined threshold value, and

wherein if said receiving quality measured is lower than said predetermined threshold value, then said second transmission power control function considers that said transmission power control signal indicates a first request for power-increase, and said second transmission  
10 power control function increases said current transmission power.

14. The system as claimed in claim 2, wherein said first transmission power control information includes a first synthesized signal from a first number of first transmission control signals received said first number of  
15 times and transmitted from each of said plural link base stations, and said first transmission power control function controls said current transmission power based on said first synthesized signal,

wherein said second transmission power control information includes a second synthesized signal from a second number of second  
20 transmission control signals received said second number of times and transmitted from said at least one packet-transmitting base station as well as a third synthesized signal from said first number of second transmission control signals received said first number of times and transmitted from

said at least one packet-transmitting base station, and said second transmission power control function controls said current transmission power based on said second synthesized signal before said at least one mobile station will make said first transmission of said  
5 acknowledge/non-acknowledge signal to said at least one packet-transmitting base station, and said second transmission power control function controls said current transmission power based on said third synthesized signal after said at least one mobile station has made said first transmission of said acknowledge/non-acknowledge signal to said at  
10 least one packet-transmitting base station.

15. The system as claimed in claim 14, wherein said second number is smaller than said first number.

15 16. The system as claimed in claim 1, wherein if said at least one mobile station is placed in said first state, then said second transmission power control function makes a packet-transmitting-base-station priority control for controlling said current transmission power based on a transmission control signal which indicates at least one of a first request for  
20 power-increase and a second request for power-decrease and which has been transmitted from said at least one packet-transmitting base station, and  
wherein if said at least one mobile station is placed in said second state, then said second transmission power control function makes a

power-down priority control for decreasing said current transmission power by a predetermined power level if at least one of transmission power control signals transmitted from all of said plural link base stations indicates a request for power-decrease, and for increasing said current  
5 transmission power by another predetermined power level if all of said transmission power control signals transmitted from all of said plural link base stations indicate another request for power-increase.

17. A mobile station included in a cellular system and being  
10 concurrently linked through dedicated physical channels to plural link base stations in a soft handover state, said mobile station including :

a first transmission power control function of controlling a current transmission power of an up-link of said dedicated physical channel based on a first transmission power control information included in  
15 down-links of said dedicated physical channels of said plural link base stations ; and

a second transmission power control function of controlling said current transmission power of said up-link of said dedicated physical channel based on a second transmission power control information  
20 included in a down-link of said dedicated physical channel of at least one packet-transmitting base station of said plural base stations, and said at least one packet-transmitting base station transmitting at least one packet through a common channel to said mobile station, and



wherein if said mobile station is placed in a first state to receive a packet from said at least one packet-transmitting base station, then said mobile station activates said second transmission power control function, and

5            wherein if said mobile station is placed in a second state other than said first state, then said mobile station activates said first transmission power control function.

18.            The mobile station as claimed in claim 17, wherein after said  
10    mobile station has been placed in said first state, then said second transmission power control function decides an off-set power based on said second transmission power control information and increases said current transmission power by said off-set power, before said mobile station will make a first transmission of an acknowledge/non-acknowledge signal to  
15    said at least one packet-transmitting base station.

19.            The mobile station as claimed in claim 18, wherein said second transmission power control function adjusts said off-set power based on said second transmission power control information which includes a  
20    difference in propagation loss between said at least one packet-transmitting base station and other of said plural link base stations in said soft handover state than said at least one packet-transmitting base station.

20. The mobile station as claimed in claim 18, wherein said second transmission power control function adjusts said off-set power based on said second transmission power control information which includes the number of times of receipt of a first transmission power control signal  
5 indicating a request for power-increase from said at least one packet-transmitting base station for a predetermined period of time.

21. The mobile station as claimed in claim 18, wherein said second transmission power control function adjusts said off-set power based on  
10 said second transmission power control information which includes a receiving quality of a common pilot signal transmitted from each of said plural link base stations in said soft handover state.

22. The mobile station as claimed in claim 18, wherein said second  
15 transmission power control function adjusts said off-set power based on said second transmission power control information which includes the number of times of receipt of a null transmit power control signal having a receiving quality lower than a predetermined threshold receiving quality level transmitted from said at least one packet-transmitting base station.

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23. The mobile station as claimed in claim 18, wherein after said mobile station has activated said second transmission power control function, then said second transmission power control function decides said

off-set power.

24. The mobile station as claimed in claim 18, wherein after said mobile station has activated said second transmission power control  
5 function, then said second transmission power control function decides said off-set power based on a difference between said second transmission power control information received from said at least one packet-transmitting base station and other transmission power control information received from other of said plural link base stations in said soft  
10 handover state than said at least one packet-transmitting base station.

25. The mobile station as claimed in claim 18, wherein said second transmission power control information includes a first number of times of receipt of a first transmission power control signal which indicates a first  
15 request for power-increase, and a second number of times of receipt of a second transmission power control signal which indicates a second request for power-decrease,

wherein said second transmission power control function counts said first and second transmission power control signals separately, and  
20 said second transmission power control function compares said first number counted to a predetermined first threshold value and also compares said second number counted to a predetermined second threshold value, and

wherein if said first number counted exceeds said predetermined first threshold value, then said second transmission power control function increases said current transmission power, and if said number counted exceeds said predetermined second threshold value, then said second  
5 transmission power control function decreases said current transmission power.

26. The mobile station as claimed in claim 25, wherein said predetermined first threshold value is smaller than said predetermined  
10 second threshold value.

27. The mobile station as claimed in claim 18, wherein said second transmission power control information includes a transmission power control signal transmitted from said at least one packet-transmitting base  
15 station, and said second transmission power control function measures a receiving quality of said transmission power control signal and compares said receiving quality measured to a predetermined threshold value, and

wherein if said receiving quality measured is lower than said predetermined threshold value, then said second transmission power  
20 control function considers that said transmission power control signal indicates a first request for power-increase, and said second transmission power control function increases said current transmission power.

28. The mobile station as claimed in claim 18, wherein said first transmission power control information includes a first synthesized signal from a first number of first transmission control signals received said first number of times and transmitted from each of said plural link base stations, and said first transmission power control function controls said current transmission power based on said first synthesized signal,

wherein said second transmission power control information includes a second synthesized signal from a second number of second transmission control signals received said second number of times and transmitted from said at least one packet-transmitting base station as well as a third synthesized signal from said first number of second transmission control signals received said first number of times and transmitted from said at least one packet-transmitting base station, and said second transmission power control function controls said current transmission power based on said second synthesized signal before said mobile station will make said first transmission of said acknowledge/non-acknowledge signal to said at least one packet-transmitting base station, and said second transmission power control function controls said current transmission power based on said third synthesized signal after said mobile station has made said first transmission of said acknowledge/non-acknowledge signal to said at least one packet-transmitting base station.

29. The mobile station as claimed in claim 28, wherein said second

number is smaller than said first number.

30.       The mobile station as claimed in claim 17, wherein if said mobile station is placed in said first state, then said second transmission power control function makes a packet-transmitting-base-station priority control for controlling said current transmission power based on a transmission control signal which indicates at least one of a first request for power-increase and a second request for power-decrease and which has been transmitted from said at least one packet-transmitting base station, and  
10               wherein if said mobile station is placed in said second state, then said second transmission power control function makes a power-down priority control for decreasing said current transmission power by a predetermined power level if at least one of transmission power control signals transmitted from all of said plural link base stations indicates a request for power-decrease, and for increasing said current transmission power by another predetermined power level if all of said transmission power control signals transmitted from all of said plural link base stations indicate another request for power-increase.

20 31.       A base station included in a cellular system, and said base station in a soft handover being linked through a dedicated physical channel to at least one mobile station, and said base station transmitting at least one packet through a common channel to said at least one mobile station,

wherein said base station includes an additional function of increasing, by a predetermined secondary off-set power, a secondary transmission power for transmitting a transmit power control information to said at least one mobile station, after said base station has transmitted an  
5 advance notice of packet transmission to said at least one mobile station.

32. The base station as claimed in claim 31, wherein said additional function further decreases said increased secondary transmission power by said predetermined secondary off-set power, after said base station has  
10 received a notice of completion of packet transmission from said at least one mobile station.

33. A method of controlling a transmission power in a cellular system including at least one mobile station being concurrently linked  
15 through dedicated physical channels to plural link base stations in a soft handover state, and at least one packet-transmitting base station of said plural base stations transmitting at least one packet through a common channel to said at least one mobile station, and

wherein said method includes :  
20 a first transmission power control process for controlling a current transmission power of an up-link of said dedicated physical channel based on a first transmission power control information included in down-links of said dedicated physical channels of said plural link base

stations ; and

a second transmission power control process for controlling said current transmission power of said up-link of said dedicated physical channel based on a second transmission power control information  
5 included in a down-link of said dedicated physical channel of said at least one packet-transmitting base station, and

wherein if said at least one mobile station is placed in a first state to receive a packet from said at least one packet-transmitting base station, then said at least one mobile station performs said second transmission  
10 power control process, and

wherein if said at least one mobile station is placed in a second state other than said first state, then said at least one mobile station performs said first transmission power control process.

15 34. The method as claimed in claim 33, wherein after said at least one mobile station has been placed in said first state, then said second transmission power control process decides an off-set power based on said second transmission power control information and increases said current transmission power by said off-set power, before said at least one mobile  
20 station will make a first transmission of an acknowledge/non-acknowledge signal to said at least one packet-transmitting base station.

35. The method as claimed in claim 34, wherein said second



transmission power control process adjusts said off-set power based on said second transmission power control information which includes a difference in propagation loss between said at least one packet-transmitting base station and other of said plural link base stations in said soft handover state  
5 than said at least one packet-transmitting base station.

36. The method as claimed in claim 34, wherein said second transmission power control process adjusts said off-set power based on said second transmission power control information which includes the number  
10 of times of receipt of a first transmission power control signal indicating a request for power-increase from said at least one packet-transmitting base station for a predetermined period of time.

37. The method as claimed in claim 34, wherein said second  
15 transmission power control process adjusts said off-set power based on said second transmission power control information which includes a receiving quality of a common pilot signal transmitted from each of said plural link base stations in said soft handover state.

20 38. The method as claimed in claim 34, wherein said second transmission power control process adjusts said off-set power based on said second transmission power control information which includes the number of times of receipt of a null transmit power control signal having a

receiving quality lower than a predetermined threshold receiving quality level transmitted from said at least one packet-transmitting base station.

39. The method as claimed in claim 34, wherein after said at least  
5 one mobile station has performed said second transmission power control process, then said second transmission power control process decides said off-set power.

40. The method as claimed in claim 34, wherein after said at least  
10 one mobile station has performed said second transmission power control process, then said second transmission power control process decides said off-set power based on a difference between said second transmission power control information received from said at least one packet-transmitting base station and other transmission power control  
15 information received from other of said plural link base stations in said soft handover state than said at least one packet-transmitting base station.

41. The method as claimed in claim 34, further including an additional process performed by said at least one packet-transmitting base  
20 station for increasing, by a predetermined secondary off-set power, a secondary transmission power for transmitting said second transmit power control information to said at least one mobile station, after said at least one packet-transmitting base station has transmitted an advance notice of

packet transmission to said at least one mobile station.

42. The method as claimed in claim 41, wherein said additional process further decreases said increased secondary transmission power by  
5 said predetermined secondary off-set power, after said at least one packet-transmitting base station has received a notice of completion of packet transmission from said at least one mobile station.

43. The method as claimed in claim 34, wherein said second  
10 transmission power control information includes a first number of times of receipt of a first transmission power control signal which indicates a first request for power-increase, and a second number of times of receipt of a second transmission power control signal which indicates a second request for power-decrease,

15 wherein said second transmission power control process counts said first and second transmission power control signals separately, and said second transmission power control process compares said first number counted to a predetermined first threshold value and also compares said second number counted to a predetermined second threshold value, and

20 wherein if said first number counted exceeds said predetermined first threshold value, then said second transmission power control process increases said current transmission power, and if said number counted exceeds said predetermined second threshold value, then said second

transmission power control process decreases said current transmission power.

44. The method as claimed in claim 43, wherein said predetermined  
5 first threshold value is smaller than said predetermined second threshold value.

45. The method as claimed in claim 34, wherein said second  
transmission power control information includes a transmission power  
10 control signal transmitted from said at least one packet-transmitting base station, and said second transmission power control process measures a receiving quality of said transmission power control signal and compares said receiving quality measured to a predetermined threshold value, and  
wherein if said receiving quality measured is lower than said  
15 predetermined threshold value, then said second transmission power control process considers that said transmission power control signal indicates a first request for power-increase, and said second transmission power control process increases said current transmission power.

20 46. The method as claimed in claim 34, wherein said first transmission power control information includes a first synthesized signal from a first number of first transmission control signals received said first number of times and transmitted from each of said plural link base stations,

and said first transmission power control process controls said current transmission power based on said first synthesized signal,

wherein said second transmission power control information includes a second synthesized signal from a second number of second  
5 transmission control signals received said second number of times and transmitted from said at least one packet-transmitting base station as well as a third synthesized signal from said first number of second transmission control signals received said first number of times and transmitted from said at least one packet-transmitting base station, and said second  
10 transmission power control process controls said current transmission power based on said second synthesized signal before said at least one mobile station will make said first transmission of said acknowledge/non-acknowledge signal to said at least one packet-transmitting base station, and said second transmission power  
15 control process controls said current transmission power based on said third synthesized signal after said at least one mobile station has made said first transmission of said acknowledge/non-acknowledge signal to said at least one packet-transmitting base station.

20 47. The method as claimed in claim 46, wherein said second number is smaller than said first number.

48. The method as claimed in claim 33, wherein if said at least one

mobile station is placed in said first state, then said second transmission power control process makes a packet-transmitting-base-station priority control for controlling said current transmission power based on a transmission control signal which indicates at least one of a first request for power-increase and a second request for power-decrease and which has  
5 been transmitted from said at least one packet-transmitting base station, and  
wherein if said at least one mobile station is placed in said second state, then said second transmission power control process makes a power-down priority control for decreasing said current transmission power  
10 by a predetermined power level if at least one of transmission power control signals transmitted from all of said plural link base stations indicates a request for power-decrease, and for increasing said current transmission power by another predetermined power level if all of said transmission power control signals transmitted from all of said plural link  
15 base stations indicate another request for power-increase.

49. A computer program to be executed for implementing a method of controlling a transmission power in a cellular system including at least one mobile station being concurrently linked through dedicated physical  
20 channels to plural link base stations in a soft handover state, and at least one packet-transmitting base station of said plural base stations transmitting at least one packet through a common channel to said at least one mobile station, and

wherein said computer program includes :

a first transmission power control process for controlling a current transmission power of an up-link of said dedicated physical channel based on a first transmission power control information included in  
5 down-links of said dedicated physical channels of said plural link base stations ; and

a second transmission power control process for controlling said current transmission power of said up-link of said dedicated physical channel based on a second transmission power control information  
10 included in a down-link of said dedicated physical channel of said at least one packet-transmitting base station, and

wherein if said at least one mobile station is placed in a first state to receive a packet from said at least one packet-transmitting base station, then said at least one mobile station performs said second transmission  
15 power control process, and

wherein if said at least one mobile station is placed in a second state other than said first state, then said at least one mobile station performs said first transmission power control process.

20 50. The computer program as claimed in claim 49, wherein after said at least one mobile station has been placed in said first state, then said second transmission power control process decides an off-set power based on said second transmission power control information and increases said

current transmission power by said off-set power, before said at least one mobile station will make a first transmission of an acknowledge/non-acknowledge signal to said at least one packet-transmitting base station.

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51. The computer program as claimed in claim 50, wherein said second transmission power control process adjusts said off-set power based on said second transmission power control information which includes a difference in propagation loss between said at least one packet-transmitting  
10 base station and other of said plural link base stations in said soft handover state than said at least one packet-transmitting base station.

52. The computer program as claimed in claim 50, wherein said second transmission power control process adjusts said off-set power based  
15 on said second transmission power control information which includes the number of times of receipt of a first transmission power control signal indicating a request for power-increase from said at least one packet-transmitting base station for a predetermined period of time.

20 53. The computer program as claimed in claim 50, wherein said second transmission power control process adjusts said off-set power based on said second transmission power control information which includes a receiving quality of a common pilot signal transmitted from each of said



plural link base stations in said soft handover state.

54. The computer program as claimed in claim 50, wherein said second transmission power control process adjusts said off-set power based on said second transmission power control information which includes the number of times of receipt of a null transmit power control signal having a receiving quality lower than a predetermined threshold receiving quality level transmitted from said at least one packet-transmitting base station.

10 55. The computer program as claimed in claim 50, wherein after said at least one mobile station has performed said second transmission power control process, then said second transmission power control process decides said off-set power.

15 56. The computer program as claimed in claim 50, wherein after said at least one mobile station has performed said second transmission power control process, then said second transmission power control process decides said off-set power based on a difference between said second transmission power control information received from said at least one packet-transmitting base station and other transmission power control information received from other of said plural link base stations in said soft handover state than said at least one packet-transmitting base station.

57. The computer program as claimed in claim 50, further including an additional process performed by said at least one packet-transmitting base station for increasing, by a predetermined secondary off-set power, a secondary transmission power for transmitting said second transmit power control information to said at least one mobile station, after said at least one packet-transmitting base station has transmitted an advance notice of packet transmission to said at least one mobile station.

58. The computer program as claimed in claim 57, wherein said additional process further decreases said increased secondary transmission power by said predetermined secondary off-set power, after said at least one packet-transmitting base station has received a notice of completion of packet transmission from said at least one mobile station.

59. The computer program as claimed in claim 50, wherein said second transmission power control information includes a first number of times of receipt of a first transmission power control signal which indicates a first request for power-increase, and a second number of times of receipt of a second transmission power control signal which indicates a second request for power-decrease,

wherein said second transmission power control process counts said first and second transmission power control signals separately, and said second transmission power control process compares said first number

counted to a predetermined first threshold value and also compares said second number counted to a predetermined second threshold value, and

wherein if said first number counted exceeds said predetermined first threshold value, then said second transmission power control process increases said current transmission power, and if said number counted exceeds said predetermined second threshold value, then said second transmission power control process decreases said current transmission power.

60. The computer program as claimed in claim 59, wherein said predetermined first threshold value is smaller than said predetermined second threshold value.

61. The computer program as claimed in claim 50, wherein said second transmission power control information includes a transmission power control signal transmitted from said at least one packet-transmitting base station, and said second transmission power control process measures a receiving quality of said transmission power control signal and compares said receiving quality measured to a predetermined threshold value, and

wherein if said receiving quality measured is lower than said predetermined threshold value, then said second transmission power control process considers that said transmission power control signal indicates a first request for power-increase, and said second transmission

power control process increases said current transmission power.

62. The computer program as claimed in claim 50, wherein said first transmission power control information includes a first synthesized signal  
5 from a first number of first transmission control signals received said first number of times and transmitted from each of said plural link base stations, and said first transmission power control process controls said current transmission power based on said first synthesized signal,  
wherein said second transmission power control information  
10 includes a second synthesized signal from a second number of second transmission control signals received said second number of times and transmitted from said at least one packet-transmitting base station as well as a third synthesized signal from said first number of second transmission control signals received said first number of times and transmitted from  
15 said at least one packet-transmitting base station, and said second transmission power control process controls said current transmission power based on said second synthesized signal before said at least one mobile station will make said first transmission of said acknowledge/non-acknowledge signal to said at least one  
20 packet-transmitting base station, and said second transmission power control process controls said current transmission power based on said third synthesized signal after said at least one mobile station has made said first transmission of said acknowledge/non-acknowledge signal to said at least

one packet-transmitting base station.

63. The computer program as claimed in claim 62, wherein said second number is smaller than said first number.

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64. The computer program as claimed in claim 49, wherein if said at least one mobile station is placed in said first state, then said second transmission power control process makes a packet-transmitting-base-station priority control for controlling said current  
10 transmission power based on a transmission control signal which indicates at least one of a first request for power-increase and a second request for power-decrease and which has been transmitted from said at least one packet-transmitting base station, and

wherein if said at least one mobile station is placed in said  
15 second state, then said second transmission power control process makes a power-down priority control for decreasing said current transmission power by a predetermined power level if at least one of transmission power control signals transmitted from all of said plural link base stations indicates a request for power-decrease, and for increasing said current  
20 transmission power by another predetermined power level if all of said transmission power control signals transmitted from all of said plural link base stations indicate another request for power-increase.